

In summary, a significant association has been established between cigarette smoking and the incidence of myocardial infarction and sudden death in males, especially in middle life, in population groups whose members appear so far to be similar except for smoking habits. The question of whether they are, in fact, similar except for smoking is, of course, basic to the problem of whether cigarette smoking actually promotes the development of coronary disease or whether it is closely associated with some other factor or factors which promote the development of coronary disease. It has been pointed out that angina pectoris, which indicates advanced coronary atherosclerosis, is less closely associated with cigarette smoking than is myocardial infarction, and that this suggests that any etiologic role of smoking in myocardial infarction should relate more to acute occlusive mechanisms, such as intravascular thrombosis or coronary spasm, than to the development of chronic arterial disease.

SMOKING AND NON-CORONARY CARDIOVASCULAR DISEASE

In surveys of large groups cigarette smoking has not been found to be associated with an increased prevalence of hypertension (3, 4, 19, 47, 49). The study of Hammond and Horn (42) did not show an increased death rate from hypertension in smokers. However, Dorn (22) found that the death rate of cigarette smokers from hypertension with heart disease was 1.53 times that of non-smokers, and from hypertension without heart disease, 1.41 times that of non-smokers. Hammond's current study shows similar figures (41). Smoking has not been found to be associated with an increased mortality rate from chronic rheumatic heart disease (22, 41, 42).

Hammond and Horn (42) found a moderate increase in the mortality rate from cerebral vascular disease in cigarette smokers as compared to non-smokers (ratio 1.30). Dorn (22) reported a ratio of 1.33, and Hammond (41) a ratio of 1.43. Although non-syphilitic aortic aneurysm is a relatively infrequent cause of death, the mortality ratio for smokers to non-smokers in this diagnostic category is large in relation to the ratios in other cardiovascular disorders. In the study of Hammond and Horn (42) it was 2.72, and in Hammond's current study (41) it is 3.10.

It has been reported (100) that diabetic males who smoke have a 50% greater incidence of clinically detectable arteriosclerosis obliterans in the legs than those who do not smoke. In general, however, there is little information about the relation of smoking to peripheral arteriosclerosis. Most experienced clinicians advise patients with obliterative peripheral arterial disease to stop smoking (43).

Buerger's disease, or thromboangiitis obliterans, has been traditionally associated with smoking, and the literature contains numerous clinical reports describing the arrest of Buerger's disease when smoking is stopped and its reactivation on resumption of smoking. The existence of Buerger's disease as an entity separate from arteriosclerosis obliterans has been recently challenged (101), but well defended (61).

It is apparent that much more work will have to be done to determine what relationship may exist between non-coronary occlusive vascular disease, aneurysmal disease, and smoking.

CHARACTERISTICS OF CIGARETTE SMOKERS

If it could be shown that cigarette smokers and non-smokers had significant constitutional differences apart from any differences that might be caused by smoking itself, then a possibility would exist that some predisposition of smokers to a particular disease might also be of constitutional origin and not caused by smoking. Cigarette smokers have, in fact, been found to differ as a group from non-smokers, but the differences, such as serum cholesterol concentration and resting heart rate, could have resulted from the smoking habit itself, so far as present knowledge indicates.

The concentration of serum cholesterol has been found to be slightly higher in smokers than in non-smokers by a number of investigators (6, 13, 49, 63, 95), but others have found no relationship (1, 54). Dawber (19) found not only that serum cholesterol was higher in smokers than in non-smokers but also that it remained higher in those who stopped smoking.

Smokers tend to be leaner than non-smokers, but to gain when they stop smoking (3, 13, 49).

A few personality differences have been reported between cigarette smokers and non-smokers. Friedman's type A men (the coronary type) tended to be heavy smokers (33). Smokers are said to be more easily angered and to eat more when under stress (94). They have been reported to marry often, to change jobs more frequently, to be more often hospitalized, and to participate more actively in sports than non-smokers (40).

Thomas (91, 95) has reported that the parents of medical students who smoke have a significantly higher incidence of arteriosclerotic and hypertensive cardiovascular disease than parents of non-smokers. Clearly, this finding is open to more than one interpretation.

Smokers tend to have a higher heart rate than non-smokers (3, 91).

The matter of constitutional predisposition to smoking has been investigated in twins. It has been found (27, 28, 32) that the smoking habits of monozygotic twins are significantly more alike than those of dizygotic twins, even when members of a twin pair are brought up separately.

In spite of some bits of suggestive evidence the existence of basic constitutional differences between smokers and non-smokers is not presently established. The constitutional hypothesis, which links smoking and predisposition to disease, is discussed in detail in Chapter 9, Cancer.

1005050597

100. Weinroth, L. A., Herzstein, J. Relation of tobacco smoking to arteriosclerosis obliterans in diabetes mellitus. *JAMA* 131: 205-209, 1960.

45. Hines, E. A. The effects of tobacco on blood pressure and in peripheral vascular diseases. *Proc Mayo Clin* 35: 337-343, 1960.

101. Wessler, S., Ming, S., Gurewich, V., Freeman, D. G. A critical evaluation of thromboangiitis obliterans. The case against Buerger's Disease. *New Eng J Med* 262: 1149-1160, 1960.

61. McKusick, V. A., Harris, W. S., Ottesen, O. E., Goodman, R. M., Shelley, W. M., Bloodwell, R. D. Buerger's Disease: A distinct clinical and pathological entity. *JAMA* 131: 5-12, 1962.

6. Bronte-Stewart, B. Cigarette smoking and ischaemic heart disease. *Brit Med J* 1: 379-384, 1961.

18. Dornoo, A. Constitution and smoking. *Science* 134: 339-341, 1961.

49. Karvonen, M., Keys, A., Orma, E., Fidanza, F., Brozek, J. Cigarette smoking, serum cholesterol, blood pressure, and body fatness. Observations in Finland. *Lancet* 1: 492-494, 1959.

63. Miller, D. C., Trulsson, M. F., McCann, M. B., White, P. D., Starr, F. J. Diet, blood lipids and health of Italian men in Boston. *Ann Intern Med* 49: 1179-1200, 1958.

95. Thomas, C. B. Familial and epidemiologic aspects of coronary disease and hypertension. *J Chronic Dis* 7: 198-203, 1953.

1. Acheson, R. M., Jessop, W. J. E. Tobacco smoking and serum lipids in old men. *Brit Med J* 2: 1108-1111, 1961.

54. Koutinen, A. Cigarette smoking and serum lipids in young men. *Brit Med J* 1: 1115-1116, 1962.

3. Blackburn, H., Brozek, J., Taylor, H. L. Common circulatory measurements in smokers and non-smokers. *Circulation* 22: 1112-1121, 1960.

27. Fisher, R. A. Cancer and smoking. *Nature (London)* 182: 556, 1958.

28. Fisher, R. A. Lung cancer and cigarettes? *Nature (London)* 182: 102, 1958.

32. Friberg, L., Kaij, L., Dencker, S. J., Jonsson, E. Smoking habits of monozygotic and dizygotic twins. *Brit Med J* 1: 1093-1092, 1959.

94. Thomas, C. B. Characteristics of smokers compared with non-smokers in a population of healthy young adults, including observations on family history, blood pressure, heart rate, body weight, cholesterol, and certain psychological traits. *Ann Intern Med* 53: 697-711, 1960.

100. Lilienfeld, A. M. Emotional and other selected characteristics of cigarette smokers and non-smokers as related to epidemiological studies of lung cancer and other disease. *J Nat Cancer Inst* 22: 239-262, 1959.